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REPORT ON A NEW METHOD OF TREATING DIPHTHERIA.

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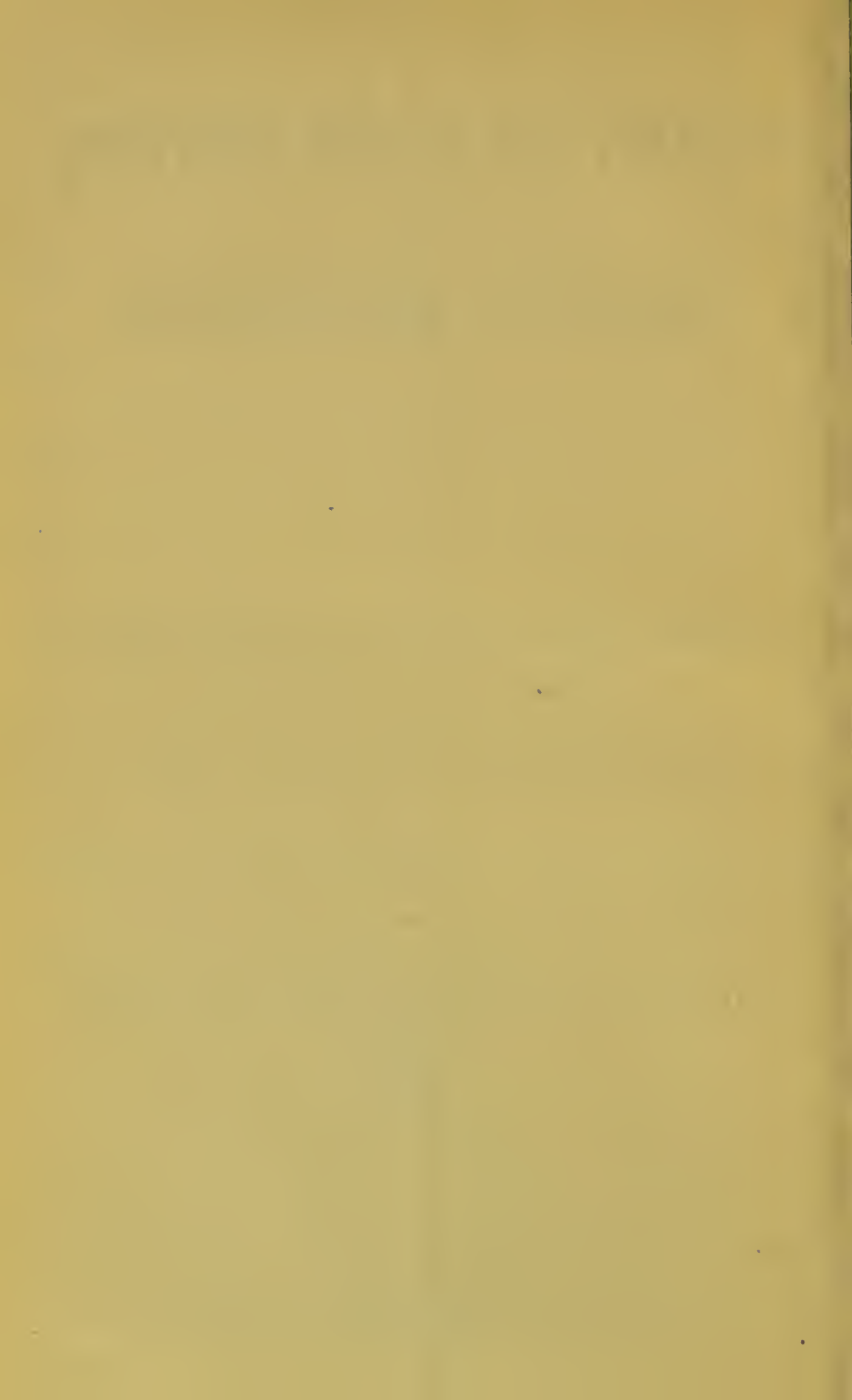
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THE TREATMENT OF DIPHTHERIA.

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In bringing under your notice a method of treating diphtheria which is new, easy of application, safe, and with some slight reservations infallible, I am prepared to meet with incredulity; such is the correct attitude of the scientific mind when confronted with a new fact or theory. I have, however, by observation and experiment, so thoroughly tested the truth of the one I now submit to you (although the total number of cases treated is only seventeen), that I do so with the greatest confidence, feeling sure that the result of investigation on your part will be to establish it on a wider and surer basis than before. I would at the same time insist upon strict accuracy in carrying out the details of treatment, for a slight error or alteration in these apparently trivial matters might, and very probably would, be fatal to a successful result. Amateur nurses, therefore, must be closely watched, for I have found that they make every conceivable mistake.

At the outset, it may be stated that this plan does not necessitate the stoppage of other methods of treatment which may be continued at the same time, if thought desirable. At the commencement of the case even vigorous local treatment is permissible, but may be dispensed with, as the membrane grows again over the surfaces from which it has been forcibly removed, and I do not think the cure is much hastened by it. Caustics in any form are not required. If local dressings be continued, they should not be too frequent, nor applied with too much force. Carbolic acid glycerine, with or without a little turpentine, or any other application preferred, may be lightly rubbed over the surface a few times a day. In a tonsil with very uneven surface, specks of deposit will linger in the crevices after most of the disease has disappeared; touching these spots will hasten the cure, and I have found tincture of iodine useful in these cases. Abrasions of mucous membrane will of course heal by whitish scar, which should not be rubbed off, but allowed to gradually disappear.

My treatment consists in the *continuous* inhalation of a vapour composed of a mixture of carbolic acid, eucalyptus oil, and turpentine, until the patient is well, and at the same time support

to the heart by stimulants, as well as tinct. digitalis, tinct. belladonnæ, and spirits ammon. aromat. The principle of inhalation is not new, neither are the ingredients, but the method of applying it, and its continuous use, I believe, are so. It is on the application of well-known principles to the cases under consideration that any claim I may make to originality must rest. The method is this :—Place the patient in bed—this is imperative—firstly in order to facilitate the inhalation ; and secondly, by the retention of the horizontal position as much as possible to spare the heart, for there is decided depression in some cases, especially if the patient be young, or the stronger mixture be used ; but with proper precautions it is not alarming. Fix a tent over the patient by arranging a sheet, or otherwise—in cases of children always, with adults generally ; this should not be too large, and should be closed in on every side, *except in front of his face*, so that he can look about and also be readily watched, and to allow a supply of fresh air for respiration. Clothe him lightly, as the cot soon becomes warm. Mix the ingredients together in the following proportions :—carbolic acid 1, eucalyptus oil 1, turpentine 8. This is the most generally useful proportion, but greater strength combined, as I believe, with greater efficiency, may be gained by increasing the relative proportion of the two first, either to carbolic acid 1, eucalyptus oil 1, turpentine 6, or even to turpentine 4 ; this is, however, decidedly more depressing, and more distinctly affects the urine—the carbolic acid, apparently, being the depressing agent. The former strength is generally sufficient, and can apparently be borne for any length of time, it is therefore better to use it in all cases of very young children, and to return to it even in older patients after the stronger has been used for three or four days, if the weakness of the pulse, or a dark clouded condition of the urine show too much carbolic acid absorption. The judgment of the medical attendant must be exercised in this matter, but the strengths 1-1-8 (weak) and 1-1-4 (strong), are the limits I have found it advisable to fix for its composition ; less than the one is too weak to be effectual, stronger than the other I have never tried, but feel sure it could not long be tolerated. No water, spirit, or other ingredient should be mixed with them.

In young children, and in all laryngeal cases, use steam continuously in the cot, either by special apparatus, or by placing

a bucket at the foot in which boiling water is renewed every half hour, day and night. In the mixture soak two cloths, linen or otherwise, about a foot square; place one close to the face, the other on the pillow near the head, on pieces of paper to avoid unnecessary soiling of the bed clothes; in adults, or children over eight or ten years of age, one or two other cloths of the same size may be soaked and hung about the cot; these must all be kept moist with the mixture, as they tend to become dry, but need not be actually dripping. Care must be taken that they do not touch the face, although very close to it, otherwise the skin will become burnt; a wire cage might possibly be arranged to avoid this difficulty. The nurse must watch to see that they are always sufficiently near to give off a strong odour close to the patient's mouth, or several cloths must be used in the tent, so that it may be filled with the vapour.

If old enough to keep the mouth open, he should do so voluntarily, a piece of cork or wood being placed between the back teeth to assist him, for there is considerable difficulty in maintaining the mouth long in this position. I have found that a child of four will do this without trouble; if younger, or unmanageable, or if the case do not progress satisfactorily, plug the nostrils loosely with cotton-wool as well, or instead. This necessitates keeping the mouth open in order to breathe. The actual impact of the vapour on the diseased spot is essential to cure, and by the method mentioned this is facilitated. Sometimes the child will talk or sing, while at others he will simply sit in his cot and roar; in either case, plugging of the nostrils is not necessary, but it is often of the greatest assistance, and should seldom be omitted, especially during sleep. This, of course, applies only when the deposit is chiefly on the tonsils or soft palate; when laryngeal only, it is unnecessary, and even if pharyngeal as well, it will generally be safe to omit at any rate the nostril plugs, for the cure of the laryngeal portion of the disease takes so long that the pharyngeal portion almost certainly disappears at the same time. Should there be nasal diphtheria also, the nostril plugs must be omitted, at any rate at intervals. The vapour must be applied in the manner described, *and in no other*. One of my patients was nearly lost through the nurse putting the mixture into the hot water whence the steam was derived, and omitting to put it on the cloths, it appeared to be almost inert; while, on the other

hand, if applied by vaporization by a spirit lamp, as recommended for disinfecting purposes, it causes headache, and is, I think, much too strong for patients, especially if young. Simple evaporation from the cloths themselves is sufficient. The steam mixing with the vapour in the tent softens it, and thereby prevents too great irritation of the mucous membrane. I have generally used Calvert No. 5 as being cheaper, but No. 2 is pleasanter, and causes less discomfort.

In some cases, the heart depression is considerable, especially if the 1-1-4 strength be used, or the case be long continued. To combat this, give from the commencement of the case brandy or other spirit in full but regulated doses, also tinct. digitalis, tinct. belladonnæ, and spir. ammon. aromat. at intervals of four hours, and in quantities suited to the age of the patient; also, as much food as he can be persuaded to take. This weakness of the heart's action must be remembered if it be decided to continue other treatment at the same time, so that the patient be not too long kept in a sitting position. The soreness of the throat also, that in bad cases usually comes on twenty-four or thirty-six hours after commencing the treatment, will require to be remembered, as any local dressing is then very painful. There must, of course, be no cessation of treatment, or the disease will quickly progress, even at the eleventh hour, so that it is well to continue the inhalation for twenty-four hours after all signs of the disease have disappeared. From four or five to ten days are required for a cure, only the very earliest seen cases taking less than four; laryngeal ones generally take longer than pharyngeal.

The effects of treatment begin to show themselves within twenty-four hours; supposing the case to have been a bad pharyngeal one, with extensive deposit, and the 1-1-4 mixture to have been used without steam. Firstly, the intervals between the patches gradually clear up, and become red. If the mouth has been kept open, this change is apparent in every part, especially on the front; whereas, if the breathing has been through the nose, the improvement is most apparent at the posterior part. Secondly, the deposit becomes altered in colour, grey, and dead-looking; the edges loose and well-defined, and gradually their size diminishes. After a time the redness of the palate begins to show through the deposit, and finally the whole

thing vanishes. There is *no expectoration*, and no coming away in pieces, it simply dissolves away and disappears, leaving the throat intensely red and sore ; the treatment being still continued, this will also gradually pass away, but at this stage the 1-1-8 is strong enough to complete the cure. In milder cases, or if steam be used, there is less redness, sometimes very little, especially with the 1-1-8 mixture, but the membrane slowly dies and disappears in the same way. If the plugs be removed from the mouth and nose for some hours, the membrane gradually grows again on the tonsils, even though the deposit in the larynx may be softening down from the inhalation through the nose, but it will again disappear if not disturbed. Occasionally, it appears to progress in spite of every precaution apparently having been taken, but it will generally be found, on enquiry, that some mistake has been made, the omission of the plugs from the nostrils being the most common. If no fault can be detected, simply continue the treatment. It is usual for membrane to be re-formed on surfaces from which it has been mechanically removed, even to the end of the case, but after twenty-four hours it should not spread, but rather diminish in extent. Coincident with the local improvement, is a general one ; the fever disappears, the general condition improves, appetite returns, and the patient becomes lively and cheerful. After a while, if the case be long continued, some depression again sets in from the continued inhalation, but by attention to the instructions given, especially as regards the regulation of the strength of the mixture, this can be kept within safe limits, and under no circumstances has it been necessary to discontinue treatment altogether, so far as my experience has gone.

In laryngeal cases, steam should always be used, the membrane softens down, and is expectorated as a thick creamy or ropy phlegm ; this process continuing so long as any deposit remains in the trachea. In these cases, if far advanced, there is sometimes considerable difficulty in breathing at the commencement of treatment, owing to the broken-down membrane having to escape through an already narrowed passage, possibly still further closed by temporary swelling of mucous membrane by the treatment employed. Great benefit will often arise in such cases from the passage down to the rima glottidis of a small pad of lint fixed to a bent wire, and dipped in tinct. iodi. Some contraction of parts.

is thereby temporarily induced, and more room for breathing obtained ; it may even be necessary to repeat this more than once, but only if extreme dyspnœa be present. The question of tracheotomy will still remain an open one, but I think it will seldom be required ; curable cases will recover without it, whereas if extensive deposit be present in the lungs, tracheotomy will not save them.

At this point, I wish to draw your special attention to the limitations mentioned at the commencement of the paper. The membrane has to be got rid of, and by this method it is softened down ready for expectoration ; but should the previous duration of the disease have been such that the bronchial tubes are lined extensively with it, the amount to be thrown off is too much for the possibility of recovery, particularly if the patient be very young, he dies drowned by the disintegrating membrane, even while undergoing a process of cure. Three or four days' duration of the laryngeal variety, before the treatment is commenced, is as much as I think we can expect our patients to recover from, but after this date, there should be few left to reach that stage ; if pharyngeal only, I believe there is no amount or duration of the disease which this method will not cure. It is possible also that very young, or otherwise diseased children may not tolerate the remedy sufficiently long for a cure. I have, however, used the 1-1-8 mixture with success in the case of a child under two years old for five days, and in one of eleven months for three days ; there were no bad symptoms whatever, but the quantity used was comparatively small. I have even applied it carefully for an hour at a time, four times a day, to a child of seven weeks, without bad symptoms. The foregoing reservations are all I feel called upon to make, in expressing my conviction of its absolute reliability.

So far I have had none of the after-effects of diphtheria, such as paralysis, although several of the cases have been of maximum severity, I am therefore induced to hope that, by this method, the disease may be stamped out of the system altogether. Where the larger proportion of carbolic acid is used, the urine becomes after a time loaded with lithates, and very dark coloured, and this is an indication for lessening the strength, when it quickly recovers its normal appearance. In the cases I have tested, there has been no other important change in it, but from various causes I have

not given full attention to this part of the subject. The minuteness with which I have given the details may perhaps convey the idea that this treatment is troublesome, but as a matter of fact it is simplicity itself, an altogether different affair from the hourly dressings which were formerly ordered. So simple is it, and so near has the Profession been to the discovery for twenty years past, that it is strange it should not sooner have been made. My own opinion is, that many cases have been cured by the disinfection carried out in the sick room, while various other methods of treatment which have been collaterally applied have gained the credit. I should wonder still more at this were it not for my own experience, for, as I shall presently show, it was only by a sort of compulsion that I was induced to give up a pre-conceived idea, and accept the true interpretation of facts.

One great advantage of this method is, that it disinfects at the same time, so that by the usual sprinkling of carbolic acid powder on the floor, and (if the patient be an adult) an occasional evaporation of this mixture in water by a spirit lamp, as recommended by Dr. J. Lewis Smith in "*Keating's Cyclopædia of Children's Diseases*," all germs are destroyed, and the sick room rendered as safe as any in the house. Since I commenced this treatment, no instance has occurred of any other member of the family subsequently taking the disease, except in the first, when, although using the vapour, I was not convinced of its value, and did not use so much care as in later cases; in this instance the father, who had been acting as nurse, took it in a mild form, but soon recovered. Sulphur in any form is unnecessary, and as it is irritating to the throat, is not advisable in this connection.

This method may, of course, be extended to the treatment of other diseases, particularly those accompanied by throat or lung complications, such as whooping cough, influenza, and scarlet fever. In a modified form, I have used it for the amelioration of the first of these, applying it for one or two hours at a time, several times a day, the patients varying in age from sixteen years to seven weeks. It has given considerable relief, but the length of time which would be required to cure is not certain. In one girl, aged seven years, who came under my care for diphtheria while recovering from whooping cough, it had not quite disappeared after thirteen days. As a palliative, it will be much used, and will assist in the cure. It is not impossible that wider uses may be

found for this method as experience is gained ; possibly even cholera, small pox, or typhoid fever may be benefited by treatment arranged on these lines, for although somewhat depressing, it is so in a different manner from the disease, and may, therefore, be probably used with as little risk as in diphtheria. It is certain that constitutional effects are produced by it.

It may be interesting to you to learn the steps by which I arrived at my conclusions. I will, therefore, relate their history as briefly as possible. The first case treated in this manner was a boy aged nine years. When first seen, he was suffering from an attack of combined pharyngeal and laryngeal diphtheria of several days' duration. He was voiceless, breathing with difficulty, and with the usual croupy noise, the chest falling in at each inspiration, livid around the lips and eyes, restless and tossing about, with perspiration on the face. The deposit on the pharynx was of medium extent, the laryngeal portion being the most important. I considered it a perfectly hopeless case. At this time, one child of six was lying dead in the house from the same disease, another of five had a slight pharyngeal attack, while another of two had been sent out of the house to avoid infection, but (as it proved) too late, for he was soon brought back to be under my care for the same disease. The ordinary methods of treatment were evidently useless in such a case, something decided, and even severe required to be done at once in order to give him any chance of recovery. As the chief part of the disease was laryngeal, I determined to leave the pharynx alone, and watch the effect of treatment upon the deposit there. Having recently read the "Memoirs of the Rev. Sydney Smith," by his daughter Lady Holland, I still retained a lively recollection of the account there given (page 55) of the cure of an attack of croup, evidently diphtheritic, in his daughter aged 6 months, by the administration of calomel in doses amounting to thirty-two grains in twenty-four hours. I determined to use mercury freely in this case, and applied mercurial ointment in large quantity to the skin of the neck and throat ; at first an ounce a day was used, after two days about a quarter of that amount, gradually diminished. I also used borax as recommended by Hood of London, but much more freely than he orders, a small quantity being put into his mouth every half-hour day and night for six days, afterwards, as he improved, less frequently, but continued until well. So many of

the family having been attacked, I thought it advisable to thoroughly disinfect the house at the same time, so that in addition to the usual methods of disinfection, I ordered that recommended by Dr. J. Lewis Smith, in his article on Diphtheria, in the first vol. of "Keating's Cyclopædia of Children's Diseases," page 654, which consists of the evaporation, by means of a spirit lamp, of water in which some of the 1-1-8 mixture has been placed. There was some difficulty in procuring the spirit lamp, and as no other method of evaporation could be devised, I recommended dipping rags in the mixture without water, and strewing them about the room, and in the bed.

It is unnecessary to follow out the case in detail; the continuance of the treatment was only secured by constant watching on my part; I even had to carry the carbolic acid with me on one occasion to ensure its being used; the other ingredients were sometimes present, sometimes not. At one time, I thought a few hours the outside limit one could fix for him to live; but at length, after ten days' treatment, he recovered, as much to my surprise as that of his friends, cured, as I thought, by the mercurial ointment, possibly aided to some extent by the borax, for I did not then dream that any part of the result could be due to the inhalation of the vapour thus carelessly applied.

After such a successful termination to a case apparently hopeless, I naturally treated all those which came under my care at that time in the same way, and for a while with uniform success. So convinced had I become of the value of the mercurial inunction, that a paper for this Society had been contemplated, in which the cure of the disease was to be explained on these lines. But at length, my theory received a rude shock. A lady over 30, a relative of my own, who had not been exposed to any known cause of infection, consulted me for a sore throat. This was at first trifling in degree, and not definite in its characteristics—one of those cases which are doubtless repeatedly passed over as "ulcerated throat;" glycerine and tannin had been used, and I recommended its continuance, giving borax also at short intervals. In spite of this, the disease progressed, and all doubt as to its nature was soon at an end. The mercurial inunction was now used freely, and borax blown down the throat every half-hour day and night, besides small quantities being taken in the intervals. Her anxiety prevented her from sleeping, and in spite of advice

to the contrary, she spent most of her time in examining her throat with a mirror, and of course not lying down. My own mind was so firmly fixed upon the inunction that, for the time, other considerations were to a great extent banished, so that beyond what was derived from the carbolic acid powder on the floor, no inhalation was used. The inunction was carried nearly to salivation, and the borax to saturation, and yet the disease progressed with alarming rapidity. Local applications were now evidently useless, for the whole fauces, in addition to being greatly swollen, so that swallowing was nearly impossible, were covered throughout, including the front of the palate and uvula, with thick deposit. In a state of mind very far from enviable, I now set myself to consider the particulars of my former cases, of which there had been six, all successfully treated in this way, besides several others, in which mercury, borax, or both, had been combined with other treatment. At length I came to the conclusion that the only item omitted was the inhalation of the vapour from the cloths, as above described. Despairing of obtaining any benefit from other treatment at this stage, but, at the same time, hoping very little from such an apparently insignificant matter, I yet determined to make the details correspond precisely with those of the successful cases, and therefore sent written instructions, after my visit, for the inhalation of the 1-1-8 mixture to be commenced. Owing to some mistake, my letter was not opened, and a delay took place, which did not improve the appearance of the throat at the time of my next visit, six hours later. Twelve hours after the commencement of its use, slight improvement was apparent; in twenty-four hours this had so far advanced that cure was evidently a mere matter of time; the patient was now safe, and my own mind relieved from one of the most pressing anxieties which the profession has ever entailed upon me. I now increased the strength of the mixture to 1-1-4, and in five days the whole of the deposit had disappeared. This experiment, which had not been premeditated, was conclusive to my own mind, but as mercury and borax had been used (as they were even to the end of the case, for I was disinclined to make any further alteration), they might possibly have had something to do with the result, it was necessary therefore to eliminate them from the calculation by omitting them in subsequent cases; this I have since done, and

have proved thereby that the inhalation is the active, and I believe, the only active agent.

In both the cases quoted, the weakness of heart was considerable, especially in the latter, but the mercury and borax probably contributed to this in no small degree, also the great strength of the mixture (1-1-4) used, for in subsequent cases I have distinctly noticed that an increase in the proportion of carbolic acid has this effect, whereas the 1-1-8 can be used without any fear whatever. Brandy was given freely, also the mixture of tinct. digitalis, tinct. belladonnæ, and spir. ammon. aromat. every four hours, which kept it within safe limits.

I will not detain you with descriptions of my subsequent cases, but append a tabular list, which will enable you to see the results of treatment, and also a few of the details. Severity is generally a question of duration, for the two cases of women, aged 26, threatened to be very extensive and severe, but improved at once on commencement of inhalation. The little girl who was thirteen days under treatment, owing to the disease springing up again from small specks of deposit concealed in the sulci of the tonsils, after apparent cure, did not suffer in any way from the prolonged inhalation. Tincture of iodine locally, in addition to the inhalation, finally cured. Her's was the most tedious case I have had, but never severe.

In conclusion, I desire to record my conviction that diphtheria is no longer a formidable disease, but must henceforth take its place rather with the annoyances, than with the terrors, of life. But its potentialities for mischief must never be forgotten, and no precaution must be omitted which will enable us to retain over it the power we now possess.

TABULAR LIST OF CASES TREATED BY THE METHOD DESCRIBED IN THE PAPER.

SEX.	AGE.	VARIETY.	INTENSITY.	RESULT.	DURATION OF TREATMENT.	REMARKS.
M.	9	Laryngeal and pharyngeal	Very severe	Cured	10 days	Already described.
M.	2	Pharyngeal	Slight	Cured	5 "	Borax and mercurial ointment also used.
F.	13	Pharyngeal	Severe	Cured	9 "	Borax and mercurial ointment also used.
M.	7	Pharyngeal	Slight	Cured	6 "	Borax and mercurial ointment also used.
F.	6	Laryngeal and pharyngeal	Slight	Cured	3 "	Borax and mercurial ointment also used.
F.	2	Pharyngeal	Slight	Cured	3 "	Borax and mercurial ointment also used.
F.	30	Pharyngeal	Very severe	Cured	5 "	Already described. The 5 days is from the commencement of inhalation.
M.	7	Laryngeal and pharyngeal	Severe	Cured	9 "	This was a second attack; he had recovered from pharyngeal for a week.
M.	4	Pharyngeal	Medium	Cured	7 "	No other treatment, except glycerine and tannin once applied at commencement.
M.	4	Pharyngeal	Medium	Cured	8 "	Carbolic glycerine with turpentine four or five times a day for 5 days, once a day afterwards.
F.	3	Laryngeal and pharyngeal	Very severe	Died	1 "	Five days' duration before first seen, probably more.
F.	3	Laryngeal and pharyngeal	Very severe	Died	1 1/2 "	Seven days' duration before first seen; the membrane softening before death.
F.	7	Pharyngeal	Medium	Cured	13 "	Carbolic glycerine and turpentine used occasionally. Was pronounced cured at 8 days, but specks remained in crevices of tonsils and commenced to grow. Whooping cough nearly cured, but not quite. Touched also three times a day with glycerine and tannin. Carbolic glycerine and turpentine every 3 hours for 2 days, then once a day, lightly used.
M.	11 months	Pharyngeal	Slight	Cured	2 "	Carbolic glycerine and terebinth every 3 hours for 1 day, then once a day. Inhalation stopped growth at once.
F.	6	Pharyngeal	Slight	Cured	5 "	Carbolic glycerine and terebinth every 3 hours for 1 day, then once a day. Caught by sleeping with case above. Would have been very severe; there were small spots over whole fauces. Stopped at once by inhalation.
F.	26	Pharyngeal	Spreading rapidly	Cured	5 "	
F.	26	Pharyngeal	Very extensive, but taken early	Cured	5 "	

Since this paper was written, my attention has been called by my friend Dr. Connor, of Coleraine, to a paper in "Medical Reprints," April 15, 1891, p. 35, by Dr. P. Harvey, in which a description is given of a method of treating whooping cough with carbolised steam. The principle is the same, but the method of application differs. Moreover, he uses no other ingredient than carbolic acid ; I consider the combination with eucalyptus oil and turpentine safer, if not more effectual. The case mentioned in my paper had not perfectly recovered from the whooping cough after thirteen days' continuous treatment, although improvement had commenced before she came under my care. It is to the treatment of diphtheria, however, that I wish to direct your attention principally, and have only referred to the other diseases in passing.

